Name of the Programme: M. Sc.Marine Sciences
Course Code: MSC 522
Title of the Course: Ocean-Atmosphere Coupling and Climate Practical
Number of Credits: 01
Effective from AY: 2022-23

Prerequisites for the course:	Degree of Bachelor of Science of this University or an examination of any other university recognized as equivalent.	
Objective:	To analyse air-sea fluxes associated with different oceanic-atmospheric processes in the different parts of the world ocean.	
Content:	Data extraction from global data sets of shortwave radiation and analysis of its distribution/variation (6 hours; References 1, 2, 3, 4) Data extraction from global data sets of long wave radiation and analysis of its distribution (6 hours; References 1, 2, 3, 4) Data extraction from global data sets of sensible heat flux and analysis of its distribution (6 hours; References 1, 2, 3, 4) Data extraction from global data sets of latent heat flux and analysis of its distribution (6 hours; References 1, 2, 3, 4) Estimation of net heat flux from above extracted data sets and analysis of its distribution (6 hours; References 1, 2, 3, 4)	30 hrs.
Pedagogy:	Tutorials/ assignments/ practical	
References/ Readings:	1.Roll, H. U. (1965). Physics of the marine atmosphere. *International Geophysics Series*, Vol. *7*. [Ed.] J. van Miegham. London: Academic Press. 2.Pörtner, H.-O., Roberts, D. C., Tignor, M., Poloczanska, E. S., Mintenbeck, K., Alegría, A., Craig, M., Langsdorf, S., Löschke, S., Möller, V., Okem, A., Rama, B. (2022). *Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change.* Cambridge University Press. In Press. https://www.ipcc.ch/report/sixth-assessment-report-working-group-ii/ 3.da Silva, A. M., Young, C. C., & Levitus, S. (1994). *Atlas of surface marine data 1994, Vol. 1: Algorithms and procedures. NOAA Atlas NESDIS, 6.* Washington, D.C., U.S.A.: Department of Commerce. 4.Berry, D. I., & Kent, E. C. (2011). Air–sea fluxes from ICOADS: The construction of a new gridded dataset with uncertainty estimates. *International Journal of Climatology*, *31*(7), 987–1001. d.o.i.: 10.1002/joc.2059. https://rmets.onlinelibrary.wiley.com/doi/full/10.1002/joc.2059 5.Asnani, G. C. (1993). *Tropical meteorology (Volume 1).* Pune, India: Asnani, Indian Inst. of Tropical Meteorology. 6.Asnani, G. C. (1993). *Tropical meteorology (Volume 2).* Pune, India: Asnani, Indian Inst. of Tropical Meteorology. 7.Wells, N. C. (2012). *The atmosphere and ocean: a physical introduction*. Chichester, West-Sussex, U.K.: Wiley-Blackwell.	

	Masson-Delmotte, V., Zhai, P., Pirani, A., Connors, S. L., Péan, C., Berger, S., Caud, N., Chen, Y., Goldfarb, L., Gomis, M. I., Huang, M., Leitzell, K., Lonnoy, E., Matthews, J. B. R., Maycock, T.K., Waterfield, T., Yelekçi, O., Yu, R., & Zhou, B. (2021). *IPCC, 2021: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change.* Cambridge University Press. https://www.ipcc.ch/report/sixth-assessment-report-working-group-i/ 8.Shukla, P. R., Skea, J., Slade, R., Al Khourdajie, A., van Diemen, R., McCollum, D., Pathak, M., Some, S., Vyas, P., Fradera, R., Belkacemi, M., Hasija, A., Lisboa, G., Luz, S., & Malley, J. (2022). *IPCC, 2022: Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change.* Cambridge, UK and New York, NY, USA: Cambridge University Press. doi: 10.1017/9781009157926 . https://www.ipcc.ch/report/sixth-assessment-report-working-group-3/ 9.Houghton, J. T., Meira Filho, L. G., Callander, B. A., Harris, N., Kattenberg, A., & Maskell, K. (1996). *Climate change 1995: The science of climate change: contribution of working group I to the second assessment report of the Intergovernmental Panel on Climate Change* (Vol. 2). Cambridge University Press. https://digitallibrary.un.org/record/223181?ln=en	
Course Outcome:	1. An ability to explain spatio-temporal variability of fluxes and identify the possible governing factors.	